

NIAGARA WIND FARM



HIGHLIGHTS:

DESCRIPTION:

The Niagara Region Wind Farm

LOCATION:

Municipality of Niagara, Ontario

CLIENT:

Enercon Services Inc.
and Boralex Corp.

PROJECT PURPOSE:

Build 77-3.0 MW wind turbines

VALUE:

\$950,000,000

PROJECT TIMELINE:

July 2015 – October 2016

MATERIALS SUPPLIED:

Ready-Mix 130,000 m³
Aggregates -140,000 MT

MASSIVE, COMPLEX WIND TURBINE DEVELOPMENT PROJECT

The Niagara Region Wind Farm project was one of the largest in North America. Seventy-seven turbines, each 130m high are clustered across 450km² of the Niagara wine region. The total installed capacity of 230 MW is enough to power 76,000 homes per year. It is co-owned by Enercon Services Inc. and Boralex Corp.

ICONIC HIGH-PROFILE PROJECT HAD TIGHT CONSTRUCTION SCHEDULES AND COMPLEX TECHNICAL SPECIFICATIONS

Major Challenges:

- **Ambitious production schedules** included pouring one 950m³ base per day and quick and economical construction for precast concrete tower segments.
- **Heat of hydration control** during mass pours to ensure the achievement of specified concrete strengths while minimizing shrinkage cracking.
- **Weak soil under access roads** meant they would develop deep rutting in wet weather. Maintenance and additional granulars would be needed if it rained. This would increase costs and delay the schedule.



PROJECT HURDLES OVERCOME WITH TECHNICAL ADVICE, SPECIALIZED CONCRETE MIXES AND PORTABLE READY-MIX PLANTS

Lafarge's dedicated projects team shared their expertise through a collaborative relationship with the contractors and subcontractors.

Lafarge partnered with Rankin Construction and offered two mobile ready-mix plants that met volume/schedule needs. One was supplied for the bases and one for the precast segments. Local fixed plants provided supplementary volume/loads as required.

For the precast towers, Lafarge supplied Agilia®, a self-consolidating concrete that flows easily through highly congested, heavily reinforced areas. Lafarge developed four separate high-strength concrete mixes ranging from 55 to 80MPa using HE cement.

To control the heat of hydration during mass pours, and control mix costs, an optimal 50-50 GU-fly ash blend was used. Lafarge also recommended a combination of ice and chillers (cooling tap water to 3-4°C vs 15-18°C under normal conditions) instead of a more costly liquid nitrogen procedure recommended by other suppliers.

LARGE PROJECT KEPT ON TIME AND ON BUDGET

Lafarge's ready-mix plants were where Rankin and Borea needed them, when they needed them. This allowed them to keep to the demanding schedule and intertwined logistics. Rankin used Agilia® with HE cement to yield compressive strengths of 20 MPa in 10 hours and two-thirds of the final strength at 48 hours. This allowed them to tighten the overall schedule by rotating the forms each day by stripping them earlier than otherwise possible with a standard ready-mix.

The chillers and ice solution saved Borea \$100,000 (\$10/m³, plus saving on cycle times and logistics). Unlike when using a liquid nitrogen (LN) process, there was no requirement for another loading point.

The soil stabilization for the access roads meant that no additional granulars or maintenance was required. There were no interruptions of the project schedules due to road conditions. This resulted in a 10-15% cost savings. Collaborative problem solving helped the Niagara Wind Farm dream become a reality.



"Our partnerships at the Niagara wind project clearly highlight the importance of pro-active problem solving together with customers and owners to get the job done. Lafarge's mix of both experience and depth of capabilities allowed large concrete towers for wind turbines to become a reality!"

**Andrew Stewart, GM Projects & Mobile Solutions
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